

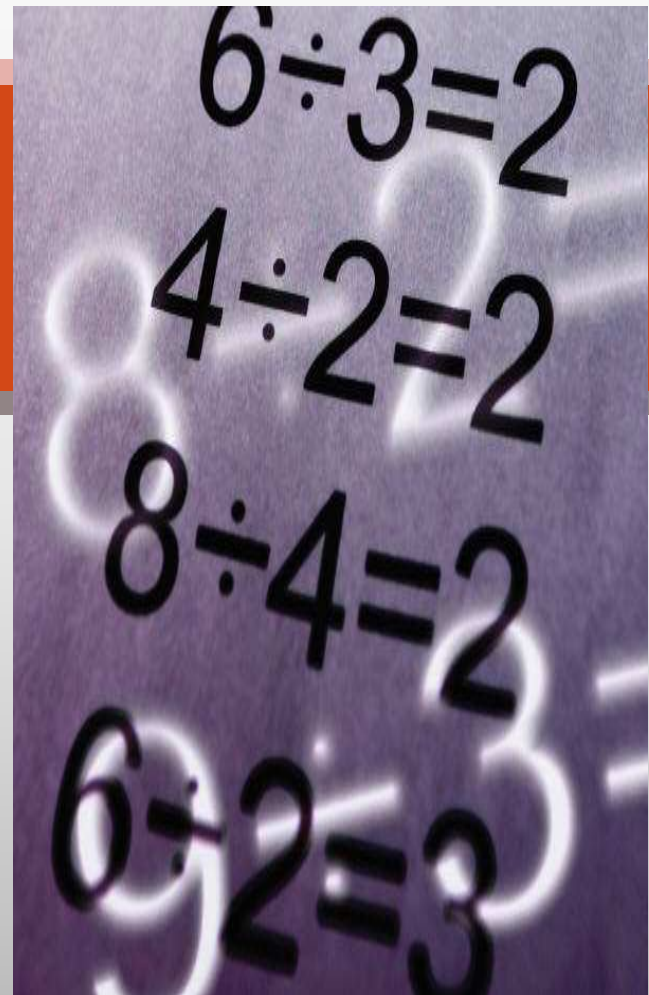
# Mathematics

Washington State

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Set higher expectations for Washington's K-12 students so they can more successfully participate in higher education and become competitive candidates for technically sophisticated jobs.

**Washington's New Standards**

- To compete in the 21<sup>st</sup> Century global economy, knowledge of and proficiency in mathematics is critical.
- Today's high school graduates need to have solid mathematics skills - whether they are headed for college or the workforce.

**National Math Panel**

Fortify content and increase the rigor of mathematics teaching. This means balancing process with content — the standard computation procedures; the conceptual understanding of math; and the application of mathematical processes to solve problems.

**Washington's New Standards**

Conceptual understanding, computational and procedural fluency, and problem solving skills are equally important and mutually reinforce each other.

**National Math Panel**

## Core Content (big ideas):

Identify a few areas of emphasis at each grade level so teachers know where to focus their teaching time. For example: In second grade, a priority is placed on knowing, doing and using addition and subtraction.

**Washington's New Standards**

- The areas to be studied in mathematics from pre-kindergarten through eighth grade should be streamlined and a well-defined set of the most important topics should be emphasized in the early grades. Any approach that revisits topics year after year should without closure should be avoided.
- Create a math standards document that is clear and easy for people to understand — teachers primarily, but also parents and interested students.

**National Math Panel**

## **Grade 2**

### ***2.2. Core Content: Addition and subtraction (Operations, Geometry/Masurement, Algebra)***

- Students focus on what it means to add and subtract as they become fluent with single-digit addition and subtraction facts and develop addition and subtraction procedures for two-digit numbers. Students make sense of these procedures by building on what they know about place value and number relationships and by putting together or taking apart sets of objects. This is the students' first time to deal formally with step-by-step procedures (algorithms)—an important component of mathematics where a generalizable technique can be used in many similar situations.
- Students begin to use estimation to determine if their answers are reasonable.

## 2.2.G Solve equations in which the unknown number appears in a variety of positions.

- Students need this kind of experience with equivalence to accompany their first work with addition and subtraction. Flexible use of equivalence and missing numbers sets the stage for later work when solving equations in which the variable is in different positions.

Examples:

$$\bullet 8 + 3 = \tilde{\square} + 5$$

$$\bullet 10 - 7 = 2 + \tilde{\square}$$

$$\bullet \tilde{\square} = 9 + 4 + 2$$

Teachers' mathematical knowledge is important for students' achievement. The preparation of elementary and middle school teachers in mathematics should be strengthened. Teachers can not be expected to teach what they do not know.

**National Math Panel**

# Mathematics

## Standards Revision and Instructional Materials Reviews

### Key Dates

#### Standards Revision

- |   |                       |
|---|-----------------------|
| • Receive initial recommendations from SBE                        | Sept .30, 2007        |
| • Public and educator input (including SBE Math Panel)            | Dec. 2007 – Jan. 2008 |
| • Present final K-12 standards to Legislature                     | Jan. 31, 2008         |
| • K-8 standards adopted   | April 28, 2008        |
| • Final recommendations from SBE for OSPI to adopt 9-12 standards | July 31, 2008         |
| • 9-12 mathematics standards adopted                              | Sept. 25, 2008        |

# Mathematics

## Standards Revision and Instructional Materials Reviews

### Mathematics Curricula Recommendations:

- |   |                                  |
|---|----------------------------------|
| • Recommendations of 3 basic curricula to SBE     | Within 6 mos. of adoption        |
| • SBE submits comment and recommendations to OSPI | Within 2 mos. after presentation |
| • Recommendations finalized / OSPI adopts         | Date not specified               |

### Instructional Materials Reviews:

#### K-8:

- |  |                   |
|--|-------------------|
| • Basic instructional materials review                           | June 22 -27, 2008 |
| • Supplemental materials review                                  | Late summer 2008  |
| • Finalize review results /<br>Determine 3 basic recommendations | By October 2008   |

#### 9-12:

- |  |                  |
|--|------------------|
| • Basic instructional materials review | To be determined |
| • Supplemental materials review        | To be determined |

## **Next steps** with K-8 Standards:

- 4-day **professional development** sessions on revised standards (summer 2008)
  - Delivered regionally and at state-level
  - To be delivered by cadre of 300+ Professional Development Facilitators
- Identify and recommend 3 basic curricula

# **Washington's New Standards**

# K-12 Curricula Recommendations

- **Legislative Requirement:** Once standards are adopted, OSPI to recommend 3 basic mathematics curricula at elementary, middle, and high school to State Board of Education for comment.
- **Instructional Materials Reviews:**
  - K-8 basic materials
  - K-8 supplemental
  - 9-12 basic materials
  - 9-12 supplemental

## Washington's New Standards

## Effective Assessment

The National Assessment of Educational Progress (NAEP) and state assessments should be improved in quality and should emphasize the most critical knowledge and skills leading to algebra.

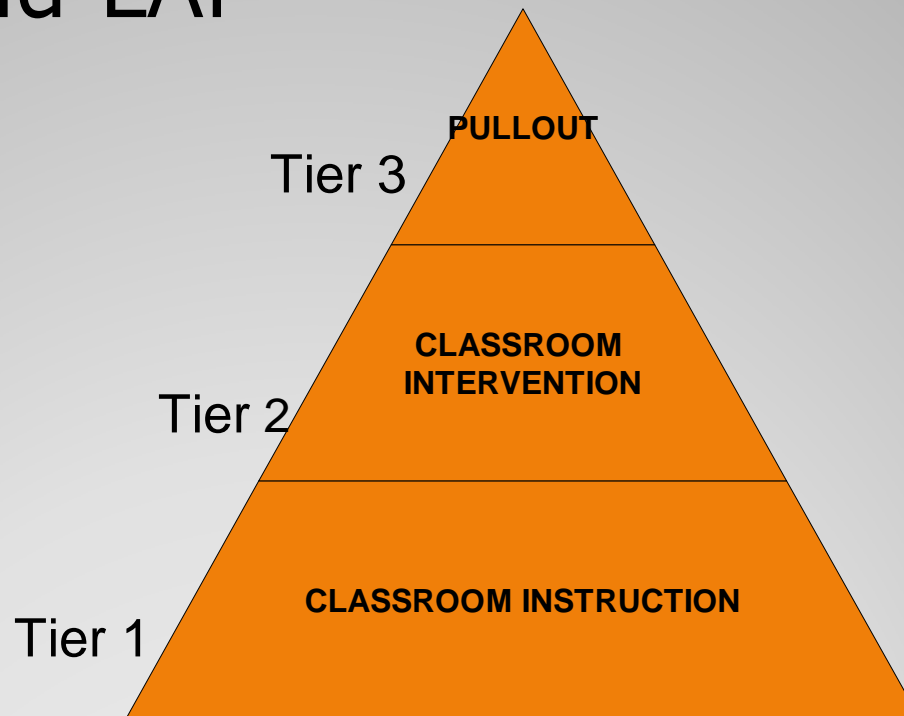
**National Math Panel**

## **Next steps** with math assessment:

- Revise the state assessment system for math accordingly
  - 2008-09 WASL Revisited and aligned to new standards
    - New items piloted
  - 2010-2011 WASL fully revised based on new standards
  - Develop end-of-course assessments for high school

**Washington's New Standards**

# Title I and LAP



**Where Do Interventions Fit?**

There is no one answer to when teachers should provide intervention instruction on a topic a particular student is struggling with. Three different timing scenarios suggest themselves, each with pluses and caveats.

**Before the class studies the topic:**

Suppose the class is studying multiplication but will begin a unit on fractions within a month, first by cutting out individual fraction kits. It would be extremely effective for at-risk students to have the fraction kit experience before the others, and then to experience it again with the class.

- **The plus:** We prepare students so they can learn *with* their classmates.
- **The caveat:** With this approach, struggling students are studying two different and unrelated mathematics topics at the same time.

Making Math Count by Marilyn Burns

## **When Should an Intervention Be Offered?**

## While the Class Is Studying the Topic:

Extra help for struggling learners must be more than additional practice on the topic the class is working on. We must also provide comprehensive instruction geared to repairing the student's shaky foundation of understanding.

- *The plus:* Intervening at this time may give students the support they need to keep up with the class.
- *The caveat:* Students may have a serious lack of background that requires reaching back to mathematical concepts taught in previous years.

The focus should be on the underlying math, not on class assignments.

For example, while others are learning multidigit multiplication, floundering students may need experiences to help them learn basic underlying concepts, such as that  $5 \times 9$  can be interpreted as five groups of nine.

Making Math Count by Marilyn Burns

## When Should an Intervention Be Offered?

## After the Class Has Studied the Topic.

This approach offers learners a repeat experience, such as during summer school, with a math area that initially challenged them.

- *The plus:* Students get a fresh start in a new situation.
- *The caveat:* Waiting until after the rest of the class has studied a topic to intervene can compound a student's confusion and failure during regular class instruction.

Making Math Count by Marilyn Burns

## When Should an Intervention Be Offered?

The meanings of words in math—for example, *mean*, *even*, *odd*, *product*, and *factor*—often differ from their use in common language.

Many students needing math intervention have weak mathematical vocabularies. It's key that students develop a firm understanding of mathematical concepts before learning new vocabulary, so that they can anchor terminology in their understanding.

**We should explicitly teach vocabulary in the context of a learning activity and then use it consistently.**

A math vocabulary chart can help keep both teacher and students focused on the importance of accurately using math terms.

## Mathematics Vocabulary

Do not confine your children to your own learning, for they were born in another time.



**Hebrew Proverb**

